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DEC 8 1937

CODE OF
STANDARD PRACTICE
AND
SPECIFICATIONS FOR PLACING
REINFORCEMENT



CONCRETE REINFORCING STEEL INSTITUTE
201 NORTH WELLS STREET
CHICAGO

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CCA

Code of Standard Practice

I. Purpose

1. **SCOPE.** The practices and customs contained in this Code are in accordance with good engineering practice, tend to insure safety in reinforced concrete construction and are standard within the Industry. The Code is made a part of every contract entered into between the Buyer and Seller of reinforcing steel and related materials unless specific provision to the contrary is made.

2. **APPLICATION.** The Code of Standard Practice is to govern as a standard in those cases where the provisions of building codes, architects' and engineers' plans and specifications, or contracts are not complete or clear. There shall be no conflict between this Code and any legal building regulations; this Code shall only supplement and amplify such laws.

II. Engineering Service

3. **TYPES.** In no way is the engineering service rendered by the Seller intended to displace the necessary work of architects and consulting engineers. The engineering assistance rendered by the Seller has for its object making speedier and more economical the handling of reinforcing steel and related products. To that end the type of engineering service falls into one of the three following classes of contracts:

(a) **List.** (Bar lists only). Where the architect's plans or engineer's drawings are sufficiently complete to serve as placing plans the engineering service of the Seller will be limited to that of preparing bills of bent and straight bars only.

(b) **Detail.** (Details and bar lists). Where the architect's plans or engineer's drawings show the complete design but are not in sufficient detail to constitute working drawings, the engineering service of the Seller will consist in preparing detailed placing plans, showing the number, size, length, mark, location and bending diagrams for all reinforcing steel, together with bills of bent and straight bars as in II-3-(a).

(c) **Design.** (Design, details, and bar lists). Where the architect's plans do not show the structural design, the engineering service furnished by the Seller is to include the preparation of a design in accordance with latest "Building Regulations for Reinforced Concrete,"

as adopted jointly by the American Concrete Institute and the Concrete Reinforcing Steel Institute except as may be modified by local building code provisions or by such standard recommendations for reinforced concrete design as the architects' specifications may designate. In addition to furnishing the structural design, the Seller will provide detailed placing plans, together with bills of bent and straight bars as in II-3-(b).

4. **RESPONSIBILITY.** Each proposal involving engineering service on the part of the Seller shall specify which of these three types is included. No responsibility can be assumed by the Seller for the correctness of structural designs or dimensions furnished by others. The Seller's plans are intended merely to supplement the architectural and structural plans and are to be used only in conjunction with them.

III. Estimating

5. **GENERAL.** Where the design is complete, and full details of all bends, dimensions, quantities, etc., are provided, estimates are to be taken off in conformity with the details shown. Where such full information is not available, the following rules will be used as a basis for the estimate. These rules, in general, conform to the provisions of "Building Regulations for Reinforced Concrete" of the American Concrete Institute (A.C.I. 501-36-T). Where the word "joist" is used in this section, it is intended also to include members sometimes referred to as "ribs."

6. **HOOKS.** No hooks or bends are to be estimated on the ends of bars except where shown on the plans or called for in the specifications.

(a) **Longitudinal Bars or Truss Bars.** Where the design requires hooks at the ends of longitudinal bars or truss bars, a length of bar equal to fifteen (15) bar diameters shall be allowed for the semi-circular hook and straight end beyond the point of tangency of the hook. The hook is to have an outside diameter of approximately eight bar diameters. The straight end beyond the hook is to have a length of approximately three inches (3").

(b) **Stirrups.** Hooks on stirrups are to be not less than three inches (3") in length.

(c) **Column Ties.** Hooks on column ties are to be not less than three inches (3") in length.

7. **DIMENSIONS.** Lengths of bars are to be estimated to the nearest three inches (3").

(a) **Beams and Slabs.** Positive moment reinforcement in beams, joists or slabs is to extend at least ten (10) bar diameters into the support either in the form of a straight length or hook.

Negative moment reinforcement in continuous construction is to extend into the adjacent span to a point one-fourth (1/4) of the center-to-center span length beyond the center of support, plus six (6) bar diameters. Full allowance shall be made for increased length due to inclined portions of truss bars. On non-continuous ends, truss bars are to extend to within three inches (3") of the outer faces of members into which they frame.

Bars provided for furnishing additional compression area in a beam reinforced for compression are to have a length equal to three-fourths (3/4) of the center-to-center distance between supports. When a beam is reinforced for compression, vertical ties are to be estimated as not less than one-fourth inch (1/4") round bars spaced eight inches (8") center-to-center and distributed over the middle half of the length of compression steel.

(b) **Columns.** Column verticals of deformed bars are to extend from floor to floor plus the following amount for lap:

	Concrete 3,000 p.s.i., or above	Intermediate Grade	Hard Grade or Rail Steel
	24 bar diam.	30 bar diam.	
Concrete less than 3,000 p.s.i.	32 bar diam.	40 bar diam.	

For plain bars the minimum amount of lap shall be twenty-five percent (25%) greater than the above. The lap in no case shall be less than eighteen inches (18"). Column bars for the top story are to stop at a point three inches (3") below the top of roof slab.

Column bars are to be estimated as bent bars on all faces where the face of the next column above is offset two inches (2") or more from the face of the column section being considered.

(c) **Footings.** Footing bars are to extend to within three inches (3") of the sides or ends of footings.

(d) **Dowels.** Length of dowels shall be not less than twice the length of lap specified in III-7-(b) but in no case less than thirty-six inches (36").

(e) **Spirals.** The spiral shall extend from the floor level in any story or from the top of footing in basement to the level of the lowest horizontal reinforcement in slab, drop panel or beam above.

In a column with a capital the spiral shall extend to the plane at which the diameter or width of the capital is twice that of the column.

The out to out diameter of spirals is to be three inches (3") less than the outside diameter of the column.

(f) **Column Ties.** The out to out dimensions of column ties are to be three (3") less than the outside dimensions of the column.

(g) **Stirrups.** The out to out width of stirrups in beams and girders is to be three inches (3") less than the width of the beam or girder.

The out to out width of stirrups in joists of concrete joist construction is to be one and one-half inches (1 1/2") less than the width of the joist.

8. **TEMPERATURE REINFORCING.** Where no temperature reinforcement is called for, none is to be estimated. In the case of one-way solid slabs where temperature reinforcement is called for but no amount shown, the following minimum percentages are to be estimated:

Floor slabs	0.002 bd
Roof Slabs	0.0025 bd

In the case of top slabs in concrete joist construction the temperature reinforcement is to be estimated as one-fourth inch (1/4") round bars spaced twelve inches (12") center-to-center, or their equivalent in bars of larger area.

Temperature reinforcement shall not be spaced more than eighteen inches (18") center-to-center.

9. **SLAB BAR SPACING.** Where slab bars are parallel to supporting beams or joists, the first slab bar is to be spaced, from the parallel support, a distance equal to the specified interval between slab bars. From this as a base, slab bars are to be spaced at the specified interval across the slab.

10. **JOISTS ADJOINING BEAMS OR WALLS.** Where a joist or a portion of one, which is eight inches (8") or less in width, is parallel to and monolithic with, or is supported by a beam or wall for its entire length, no steel is to be estimated in the joist. No extra steel is to be estimated in the beam, floor slab or next parallel joist because of the omission of steel in such joist.

11. **NUMBER OF STIRRUPS.** Where stirrups are called for and either the number or size is not indicated, the weight of the stirrups is to be twelve (12) per cent of the total weight of longitudinal straight and truss bars in the beam. In such cases bar sizes of stirrups are to be three-eighths inch (3/8") round.

12. TRUSS BARS IN BEAMS OR JOISTS. In continuous or restrained beams or joists of substantially equal spans on opposite sides of the support, approximately half the bars should be estimated as truss bars. The term "substantially equal spans" shall be construed to mean that the longer of two adjacent spans shall not exceed the shorter by more than twenty per cent (20%). In such cases the area of steel over the support should be not less than the average of the steel areas at the center of the two adjacent spans. Any deficiency in negative moment steel remaining after the area of truss bars has been determined may be supplied by straight bars of proper area.

13. COLUMN TIES. Where column ties are called for but no amount shown, they are to be at least one-fourth inch ($\frac{1}{4}$ ") rounds spaced apart not over sixteen (16) bar diameters, forty-eight (48) tie diameters or the least dimension of the column. When there are more than four (4) vertical bars, additional ties are to be provided so that every longitudinal bar is held firmly in its designed position and has lateral support equivalent to that provided by a ninety (90) degree corner of a tie.

14. LAPS. In slabs, walls, or footings under walls, longitudinal temperature bars, where lapped, are to have a lap of twenty-four (24) bar diameters, but not less than eighteen inches (18").

15. BAR SUPPORTS AND SPACERS. It is strongly recommended that bar supports and spacers be used. Where they are to be furnished but no specific number or location given, they are to be estimated as provided in IV-19.

16. SPIRAL SPACERS AND FINISHING TURNS. Spiral spacers are to be estimated in all cases and are to be figured at their theoretical weight, but at not less than 0.75 pounds per foot of vertical height for each spacer used. Their number shall not be less than that indicated in IV-18-(d). Estimate one (1) extra turn at each end of spiral for finishing.

IV. Materials

17. REINFORCING BARS. (a) **Type.** All reinforcing bars, except one-fourth inch ($\frac{1}{4}$ ") round bars are to be of a deformed type. New billet reinforcing bars are to be of intermediate grade in accordance with the current specifications of the American Society for Testing Materials. Sizes and areas are to be limited to those recommended by the Division of Simplified Practice of the Department of Commerce of the United States in their Bulletin No. 26 effective September 15, 1930, and weights

to be in accordance with standards adopted by the Concrete Reinforcing Steel Institute in 1934, as follows:

Sizes	Area Square Inches	Weight Lbs. per Ft.
Plain or Deformed Bars		
$\frac{1}{4}$ " round	.05	.167
Deformed Bars		
$\frac{3}{8}$ " round	.11	.376
$\frac{1}{2}$ " round	.20	.668
$\frac{1}{2}$ " square	.25	.850
$\frac{5}{8}$ " round	.31	1.043
$\frac{3}{4}$ " round	.44	1.502
$\frac{7}{8}$ " round	.60	2.044
1" round	.79	2.670
1" square	1.00	3.400
$1\frac{1}{8}$ " square	1.27	4.303
$1\frac{1}{4}$ " square	1.56	5.313

(b) **Identification Marks.** Deformed new billet reinforcing bars are to be marked in the process of manufacture with the Quality Mark of the Concrete Reinforcing Steel Institute and an identifying Mill Mark which definitely determines the manufacturer. (Information relating to Quality Mark and Mill Marks will be furnished upon application to the Concrete Reinforcing Steel Institute).

(c) **Weights.** Reinforcing bars sold at unit prices per pound, hundred weight or ton are to be invoiced on the calculated weights as shown by the detailed shop drawings and shop bills, based on the theoretical weights as shown in IV-17-(a).

(d) **Lengths.** Reinforcing bars are to be sheared to length with a tolerance of one inch (1"). Where exact lengths with no tolerance, or where finished ends are required, it shall be so specified and in that case the bars must be machine cut by either cold sawing or shearing and grinding, for which there is an extra charge.

(e) **Extras.** Extras will be charged for size, quantity, bending, engineering and other services rendered by the Seller in accordance with Seller's current extras.

(f) **Bending.** As a measure of adequate workmanship the bending of bars is to be considered satisfactory when the diameter of pin or lug about which they are bent complies with the following:

Truss Bars (all bends).

Diameter of pin equals not less than four (4) times the diameter or side of bar.

Stirrups and Column Ties (135 deg. to 180 deg. bend).
Diameter of pin or lug equals not less than three (3) times diameter or side of bar.

Stirrups and Column Ties (90 deg. to 135 deg. bend).
Diameter of pin or lug equals not less than two (2) times diameter or side of bar.

Dimensions of bent bars are to be out to out of bar, with a tolerance of one-half inch ($\frac{1}{2}$ "). Where exact dimensions, with no tolerance, are required, it shall be so specified in which case there will be an extra charge.

18. SPIRALS. (a) **Sizes.** Plain round rods or wire for spirals are to be furnished in the following standard sizes and areas as recommended by the Division of Simplified Practice of the Department of Commerce, in their Bulletin No. 53, effective December 15, 1932, and weights to be in accordance with standards adopted by the Concrete Reinforcing Steel Institute in 1934:

Size	Area (Square Inch)	Weights (Lbs. per foot)
$\frac{1}{4}$ " round	.05	.167
$\frac{3}{8}$ " round	.11	.376
$\frac{1}{2}$ " round	.20	.668
$\frac{5}{8}$ " round	.31	1.043

(b) **Dimensions.** The diameter of column spirals is to be taken to mean the outside diameter. The minimum pitch of any spiral is to be $1\frac{1}{2}$ " and pitch is to vary by $\frac{1}{4}$ " intervals.

(c) **Finishing.** Spirals will be furnished with one (1) extra turn at top and bottom for finishing. Where it is necessary to splice spirals it is to be done either by welding or lapping one turn.

(d) **Spiral Spacers.** The number of spacers to be used for maintaining the proper pitch of spiral is as follows:

Core Diameter	Number of Spacers
Over 0 in. to 24 in.	2
Over 24 inches	3

(e) **Shipping and Invoicing.** Shop fabricated spirals are to be shipped with two spacers attached and in those cases where more than two spacers are called for, extra spacers over two may be attached with two spacers side by side, or bundled loose with the spiral for proper attachment in the field. Unfabricated spirals are to be shipped with the spiral rod or wire coiled to the proper diameter, bundled with the proper number of turns with spacers bundled separately, for assembly in the field. Spirals, unless specifically ordered unfabricated, will be shipped shop fabricated. Spirals are to be invoiced at the weight of rods or wire used in the spiral as specified in IV-18-(a) plus the weight of the spacers used.

19. BAR SUPPORTS AND SPACERS. Bar Supports and Spacers are to be estimated sufficient in number and sufficiently heavy to properly carry the steel they support. The number shall not be less than the following:

SLABS

Concrete Joist Construction

Clear Spans	Joist Chairs per Joist
Over 0 ft. to 10 ft.	2
Over 10 ft. to 20 ft.	3
Over 20 ft. to 30 ft.	4

To support ends of bent bars in joists—use $\frac{3}{8}$ inch round bar at each side and parallel to the supporting beam or wall, such $\frac{3}{8}$ " round bar to be held above the permanent or removable form.

Solid Slabs with Principal Reinforcing in One or Two Directions

Clear Spans	Supporting Spacers per Panel (One Direction Only)
Over 0 ft. to 7 ft.	2 lines
Over 7 ft. to 17 ft.	3 lines
Over 17 ft. to 27 ft.	4 lines

To support ends of bent bars in slabs—use bar not less than five-eighths inch ($\frac{5}{8}$ ") diameter carried on high chairs spaced not more than four feet (4') apart. These bars are to be used on two opposite sides of panels when principal reinforcing is in one direction only, and on all four sides of panel when principal reinforcing is in two directions.

BEAMS

Ordinary Beams [Bars One (1) Inch Square and Smaller]

Clear Spans	Number of Beam Chairs					
	Single Layer of Bars	Two Layers		Three Layers		
		Lower	Top	Lower	Middle	Top
Over 0 ft. to 14 ft.	2	2	2	2	2	2
Over 14 ft. to 23 ft.	4	3	2	3	2	2
Over 23 ft.	See Table Below					

BEAMS OR SLABS WITH LARGE NUMBER OF $1\frac{1}{8}$ or $1\frac{1}{4}$ INCH BARS

Clear Spans	Number of Beam Chairs					
	Single Layer of Bars	Two Layers		Three Layers		
		Lower	Top	Lower	Middle	Top
Over 0 ft. to 15 ft.	2	3	2	3	2	2
Over 15 ft. to 30 ft.	4	5	2	6	2	2
Over 30 ft. to 45 ft.	6	7	3	9	3	3
Over 45 ft. to 60 ft.	8	9	3	11	3	3
Spacing of Beam Chairs in spans other than above.						
All Spans	8'0"	7'0"	14'0"	5'0"	10'0"	10'0"

FLAT SLABS

TWO AND FOUR WAY FLAT SLABS

Spans (center to center of columns)	Supporting Spacers		High Chairs (to support $\frac{5}{8}$ inch bar under ends of bent bars)	
	Column strip or Direct Band	Middle Strip or Diag- onal Band Bottom Layer	Support for Column Head Rein- forcement	Support for Negative Reinforce- ment Middle Strip
Over 0 ft. to 18 ft.	3	2		
Over 18 ft. to 26 ft.	3	3		
Over 26 ft. to 36 ft.	4	4	8	
Around Int. Columns			5	
Around Ext. Columns			4	
Around Cor. Columns				8
In Interior Panels				10
In Exterior Panels				12
In Corner Panels				

In roof slabs use one (1) more supporting spacer under column strips, direct bands, and bottom layers of middle strips or diagonal bands, and one more $\frac{5}{8}$ inch chair bar at column heads, than the number shown in the table above.

20. WIRE FABRIC. Wire fabric, unless specifically ordered galvanized, will be furnished in rolls of plain wire. Sufficient wire fabric will be supplied to provide a side lap of two inches (2") and an end lap of six inches (6"). Fabric will be furnished in full rolls only. Quantity of fabric furnished to be not less than 8% in excess of net area to be covered.

21. CONCRETE JOIST CONSTRUCTION. The Code of Standard Practice, Forms Department, Concrete Reinforcing Steel Institute, shall govern.

22. OTHER MATERIALS. Contracts for furnishing reinforcing bars and related materials do not include any of the following items: charges for surety bonds or insurance not required by law or any other general charge such as building permits, license fees or taxes for permission to work in City or State.

23. UNSPECIFIED ITEMS. Clauses in the specification to the effect that all reinforcing items necessary to complete the structure shall be furnished by the Seller whether or not they are shown on the plans or called for in specifications, being obviously unfair, will not be recognized or subscribed to.

V. Execution

24. SHOP DRAWINGS. (a) Submission. When contract involves engineering, such diagrams or plans as outlined in Section II are to be made by the Seller and submitted in duplicate, for approval, to the appointed representative of the Buyer, who is to examine and return them. Such plans, when approved without change, are to be considered the correct interpretation of the materials to be furnished.

(b) **Corrections.** When the Buyer returns the Seller's plans with corrections, the Seller is to correct the drawings and may thereupon begin fabrication of the materials. Changes from the contract plans and specifications are to be considered as extras and treated as outlined in V-29.

(c) **Approved Copies.** Corrected copies of the Seller's drawings in triplicate are to be returned to the Buyer for his use. Additional copies of the Seller's drawings or cloth prints will be furnished the Buyer at the cost of printing. The Buyer is to be responsible for delays resulting from the lack of complete data and from changes or revisions, or the tardy approval of drawings.

25. DELIVERY. Contract providing for delivery f.o.b. cars, means delivery on board cars at the nearest public railroad siding. Delivery by truck, means delivery on truck alongside curb at the job site, providing there is a road passable to a loaded truck. In case there is no passable road, the delivery is to be made as close to the job site as it is possible to drive a loaded truck. All cost of unloading either cars or trucks is to be borne by the Buyer.

26. BUNDLING AND TAGGING. (a) **General Rules.** Reinforcing Bars are to be furnished bundled and tagged in accordance with the "Rules for Standard Practice in Bundling and Tagging", as follows:

NOTE. The following rules apply to carload and less than carload lots, except where difference is specifically set forth.

	Straight Bars	Bent Bars
(a) Weight of bundle:	Bundles limited to one size and one length not to exceed 150 lbs.	150 lbs.
(b) Gauge of wrapping wire to be used:	No. 12 or hea- vier.	No. 12 or hea- vier.
(c) Wrapping wire per bundle:	One wire every 10 ft. or fraction thereof with a minimum of two wires.	Not less than re- quirements for Straight Bars.

	<i>Straight Bars</i>	<i>Bent Bars</i>
(d) Tag to be made of:	Linen or rope.	Linen or rope tags for address. Zinc tags for identification.
(e) Number of tags on each bundle:	One.	One linen or rope tag and at least two zinc tags.
(f) Information to be put on tag:	Name of customer or order number. Number of pieces, size, length, mark if any. On less than carload lots the following should appear: Name and address of customer. Number pieces, size, length and mark if any.	Linen or rope tag. Customer's name or order number. Zinc tag: Mark. On less than carload lots customer's name and address must appear on linen or rope tag and mark on zinc tag.
(g) Information to be affixed to tag by:	Tag addressing machine or water-proof ink.	On linen or rope tag: Same as straight bars. On Zinc tag: Stencil press or embossing machine.
(h) Tags attached to bundles by:	Linen or rope tag to be attached by running bundling wire through eyelet before twisting.	Zinc tags to be tied to bar with No. 18 wire. Linen or rope tags to be attached by running bundling wire through eyelet before twisting.

(b) **Metal Tags.** Metal tags are strongly recommended for use on all bundles of bars, either bent or straight, for all purposes of identification, except as address tags.

27. **QUALITY.** It is understood that a film of rust or mill scale is not objectionable and shall not constitute cause for rejection.

28. **INSPECTION.** All inspection for quality of reinforcing steel and related materials is to be made at the Seller's rolling mill or fabricating warehouse prior to cutting or fabrication for shipment, and total cost of same, including any expense for operation of testing machine, is to be borne by the buyer.

29. **EXTRA WORK OR MATERIALS.** Any work or materials desired outside of that specifically called for in the contract will not be furnished until instructions in writing have been issued by the Buyer to the Seller, at an

agreed extra cost. The Buyer will be credited only for omissions or deductions due to changes in contract plans. The Seller is not to be required nor expected to make the same unit price for additions to as for deductions from the materials required by the original contract.

VI. Standard Procedure

30. **PROPOSALS.** (a) **Presentation.** All proposals for furnishing reinforcing steel and related materials are to be made on standard contract forms as adopted by the Seller. After acceptance by the Buyer, these proposals must be approved or executed by a qualified official of the Seller, upon which the proposal becomes a contract.

(b) **Acceptance.** All proposals are intended for prompt acceptance and are subject to change without notice.

31. **INVOICES.** The invoices are to be governed by the conditions set forth in Section IV and by the provisions of the contract between Buyer and Seller.

32. **BILLING.** Contracts on lump sum basis are to be filled proportionately as shipments are made.

33. **ARBITRATION.** All business controversies which cannot be settled by direct negotiation between the parties should be submitted to arbitration. Both parties shall sign a submission to arbitration and, if possible, agree upon an arbitrator. If they are unable to agree upon one arbitrator, each shall appoint an arbitrator, at once sending a written notice thereof to the other party. The two arbitrators so appointed shall agree on a third arbitrator or, failing such agreement, the arbitrator first appointed (as evidenced by the date of the written notice of the appointment mailed to the other party) shall submit the names of not less than five (5) persons to the other arbitrator, from among whom such arbitrator shall select the third arbitrator. The expenses of the arbitration shall be divided equally between the parties unless otherwise provided for in the agreement to submit to arbitration. Unless otherwise provided for in the agreement to submit to arbitration, the arbitrators shall pass finally on all questions, both of law and fact.

34. **CONTRACTS.** The following contract forms are suggested by the Concrete Reinforcing Steel Institute.

*Suggested Form of Sales Contract
Concrete Reinforcing Steel Institute*

(On Reverse Side of Contract)

THE ABC COMPANY
CHICAGO, ILL.

To	Address	City	State	Location	Structure	Date
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We propose to furnish the following described materials required for the above structure, in accordance with the conditions of the Code of Standard Practice of the Concrete Reinforcing Steel Institute, and the following terms, including those printed on the reverse side of this sheet, which upon acceptance by you of this proposal are agreed to and accepted by you:

TERMS: Net cash 30 days, or $\frac{1}{2}$ of 1% discount on invoiced price of material exclusive of transportation charges if paid in 10 days from date of each invoice, payable in funds par at

All lists of material or approvals of placing drawings shall be furnished by
We will commence shipment within days from date of
approval of this quotation by our Home Office or, where required, from receipt
of approval of placing drawings or lists of material by our Office.

Prompt acceptance of this quotation by you and the written approval of our Home Office shall constitute a binding contract.

The above proposal is accepted:

..... Approved at Home Office
THE ABC COMPANY
Date.....

Consign to..... By..... Contract No.....
Charge to.....

This quotation is sent to you in duplicate. If accepted, sign and return one copy, and retain the duplicate for your files.

* When material is to be shipped by rail to a point outside of the city where material is rolled or carried in stock, this paragraph should read (with proper destination indicated), as follows: "Prices are f.o.b. with freight allowed at carload rate to"

Where material is to be delivered to the job by truck, this paragraph should read as follows: "Prices are f.o.b. truck alongside curb at job site."

GENERAL CONDITIONS OF SALE

You agree to carefully check material against shipping papers upon unloading at destination. No claims for shortages or for improper, defective or damaged material will be recognized by us unless written notice specifying in detail the nature and extent of the shortage, defect or damage be mailed to our Office within five days from unloading accompanied, in the case of claim for shortage or damage, by original freight bill with a notation on the face thereof by the local agent of the carrier as to the items and quantity short or damaged. When we deliver by truck, all claims for shortages or damaged material must be sent to us on date of delivery.

Upon receipt by us of the above notice, so substantiated, we agree to replace such shortages and material not up to contract requirements. We will in no case pay or be liable for any claims resulting from use of improper, defective or damaged material, and no claims will be allowed on account of any purchases or returned material, unless authorized in writing by our Home Office.

Material shall be at your risk from delivery by us to the carrier at f. o. b. shipping point. Title to material shall remain in us until payment in full by you. Your failure to furnish lists of material, to approve placing drawings, or to make payments as provided herein will entitle us to stop shipments without notice to you, to retake possession of any shipments already made, and, upon notice to you, to cancel the unexecuted portion of the contract and to hold you for damages.

We may at any time decline to make further shipments except on receipt of satisfactory security.

We assume no responsibility for the design on those jobs where we prepare placing drawings from designs furnished by others.

No conditions or representations altering, detracting from, or adding to the terms hereof, shall be valid unless printed or written hereon or evidenced in

[9]

*Suggested Form of Contract for Leasing and Erection of Forms
Concrete Reinforcing Steel Institute*

*Suggested Form of Contract for Leasing of Forms
Concrete Reinforcing Steel Institute*

THE ABC COMPANY
CHICAGO, ILLINOIS

To Address City State Date Office
We propose to LEASE, ERECT AND REMOVE (Trade Name)
forms, in accordance with the conditions of the Code of Standard Practice of the Concrete
Reinforcing Steel Institute and the following terms, to be used to pour
..... as scheduled below, for use only in the proposed building known as
..... at
(Architect) for the sum of Dollars
(\$) f.o.b. shipping point with freight and cartage allowed to job.
We will furnish forms to pour at one time
Shipment to be made within days from date of approval of
his quotation by our Home Office or, where required, from receipt of approval of placing
drawings.

SCHEDULE

(48) hours after the concrete is poured. We are to be given a reasonable time to place and oil forms before steel or other materials are installed which would interfere with the erection of our forms.

be responsible for any chipping, finishing or retouching of concrete surfaces. The forms supplied for this work are to remain at all times our property and in our possession.

THE ABC COMPANY
CHICAGO, ILLINOIS

To Office
Address Date
City State
We propose to furnish, on a LEASE ONLY BASIS, (Trade Name)
forms, in accordance with the conditions of the Code of Standard Practice of the Concrete
Reinforcing Steel Institute and the following terms, to be used to pour
as per schedule below, for use only in the proposed building known as
..... at
(Architect) for the sum of Dollars
(\$.) f.o.b. shipping point with freight allowed to railroad station
nearest to job. Forms to be returned by you, bundled, loaded on cars at your expense, and
shipped, freight collect, as directed by us.
We will furnish forms to pour at one time
Shipment to be made within days from date of approval of this quo-
tation by our Home Office or where required from receipt of approval of building engineer

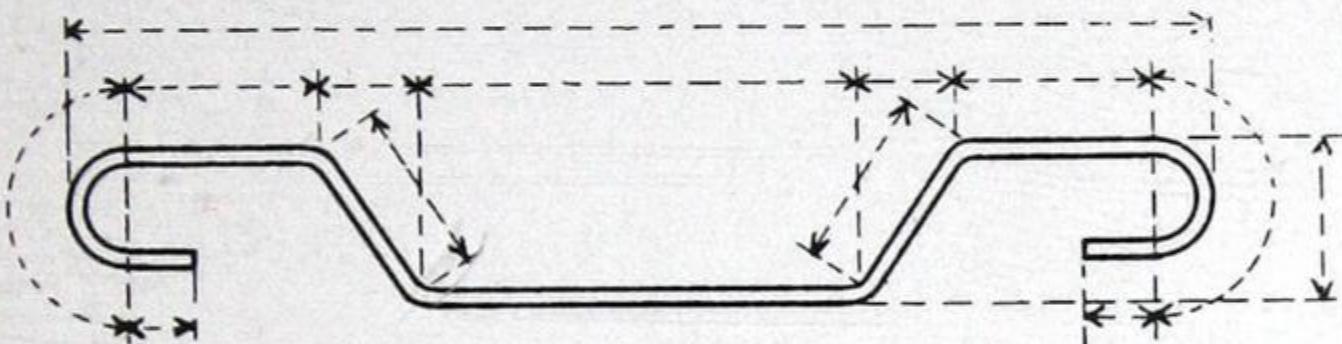
SCHEDULE E

TERMS: Net cash thirty days from date of shipment, payable in funds par at
Should the forms be retained more than months after arrival at job,
you are to pay us monthly for each additional or fraction of a month twenty (20) per cent
of the total contract price.
Forms are to be cleaned and oiled after each use, protected from damage, and returned
in good condition; ordinary wear and tear excepted. Parts cut or damaged, other than as
specified on the face of this contract, will be charged to you at Eight Cents (\$.08) per
pound. Cutting of forms for installation of mechanical trades' equipment is not considered
as ordinary wear and tear.
The forms supplied for this work are to remain at all times our property.
Column forms shall not be poured to fill more than ten (10) vertical feet at one time,
and an interval of two (2) hours shall be allowed before continuing the fill.
This agreement is subject to contingencies beyond our reasonable control, including
lockouts for reasonable cause.
You agree to check materials against shipping list upon arrival at destination, and to
report in writing to us, within five (5) days after delivery, any shortage or damage, with a
notation on the face of the original freight bill, signed by the railroad agent, as to the
quantity short or damaged. When we deliver by truck, all claims for shortages or damaged
material must be sent to us on date of delivery. No claim for shortage or damaged
material will be allowed unless reported as above.
Prompt acceptance of this proposal by you and the written approval of our Home
Office shall constitute a binding contract.

Specifications for Placing Reinforcement

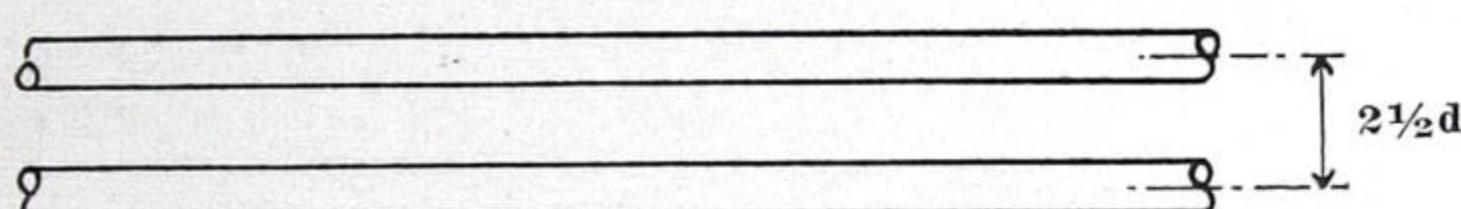
All reinforcing steel must be placed in accordance with the following requirements:

DIMENSIONS

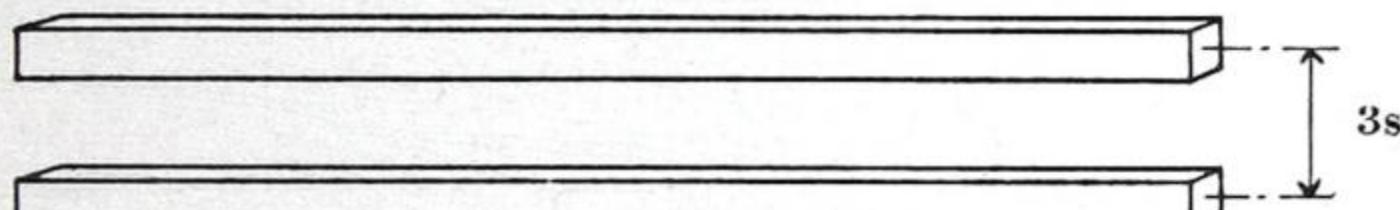


SPACING

Round Bars



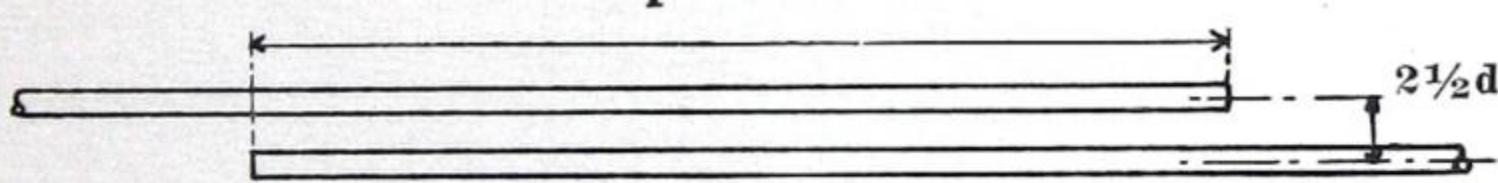
Square Bars



SPLICES

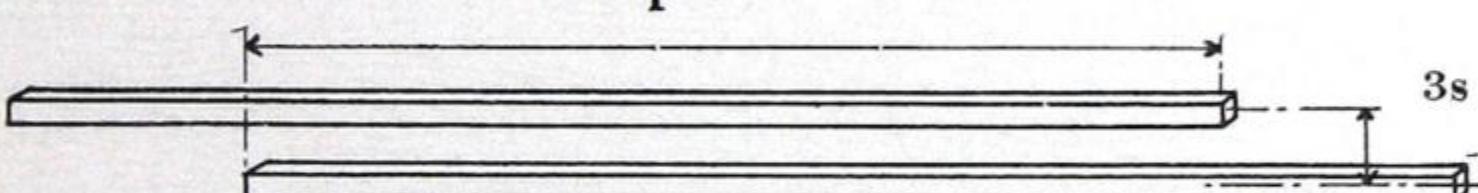
Round Bars

Lap

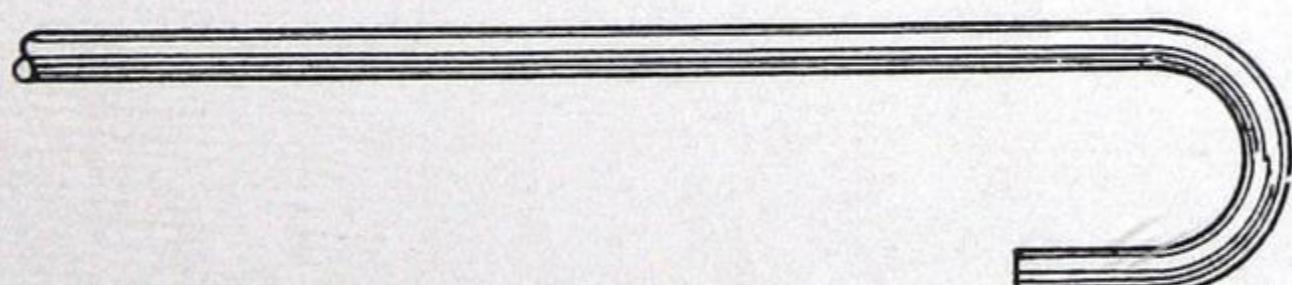


Square Bars

Lap



SPECIAL ANCHORAGE



All reinforcing steel must be placed in accordance with the following requirements:

(a) **Bars shall be Clean and Sound**—Metal reinforcement before being placed shall be free from loose rust scale, grease, clay or other coatings or foreign substances that will destroy or reduce the bond. A film of rust or mill scale shall not be considered objectionable. Steel bars shall not be bent or straightened in a manner that will injure the material. Bars with kinks or bends not shown on the plans shall not be used.

(b) **Bars shall be Formed to Correct Dimensions**—Reinforcement shall be carefully formed to the dimensions indicated. Lengths, depths, and radii as shown on the bending details must be correctly reproduced within the tolerance provided in IV-17.

(c) **Bars shall be Properly Spaced**—The minimum center to center distance between parallel bars shall be two and one-half ($2\frac{1}{2}$) times the diameter for round bars or three (3) times the side dimensions for square bars. In no case shall the spacing between bars be less than one inch (1") nor less than one and one-third ($1\frac{1}{3}$) times the maximum size of the coarse aggregate.

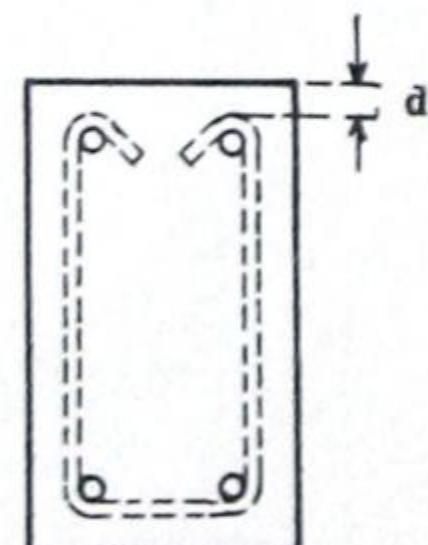
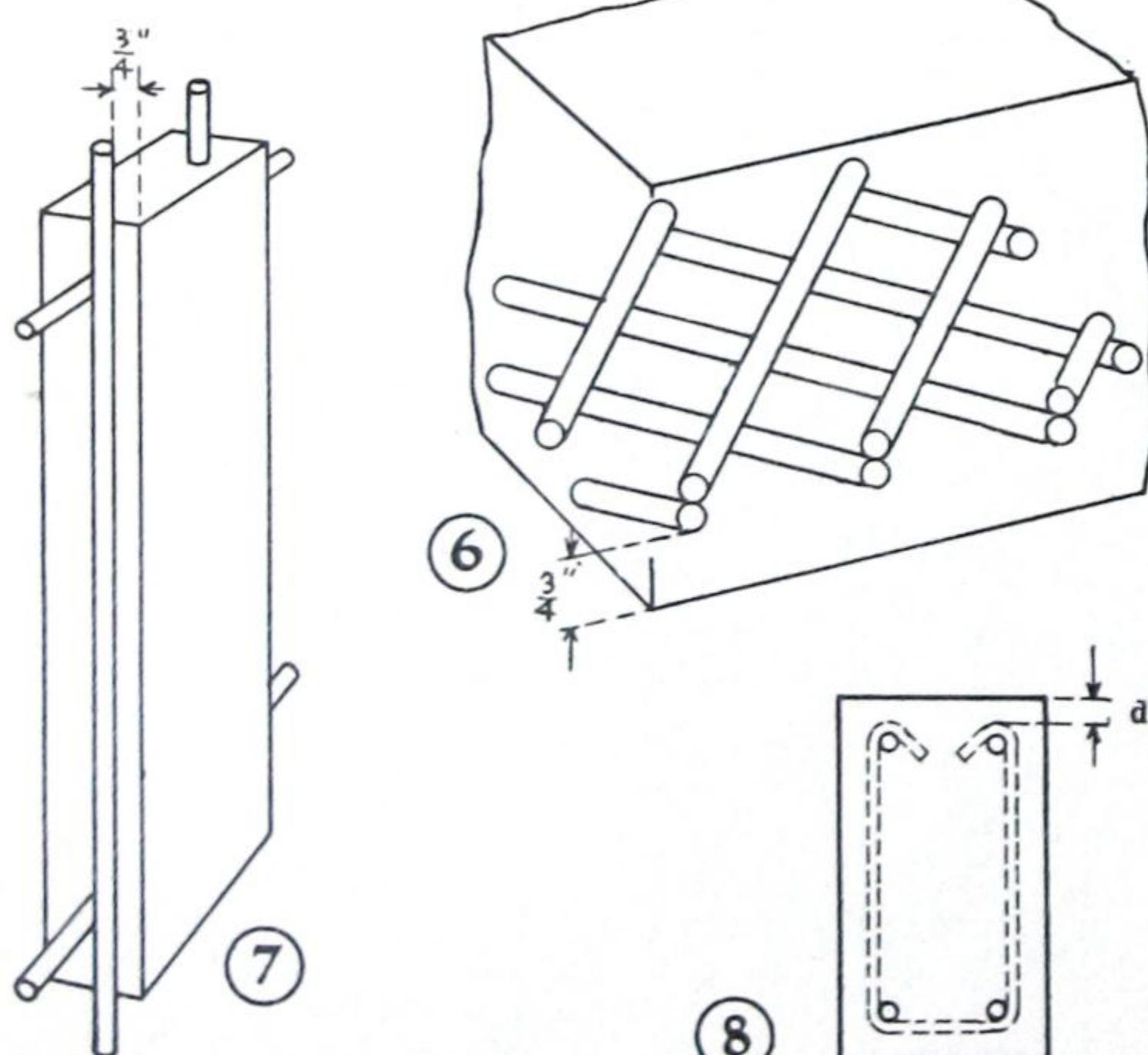
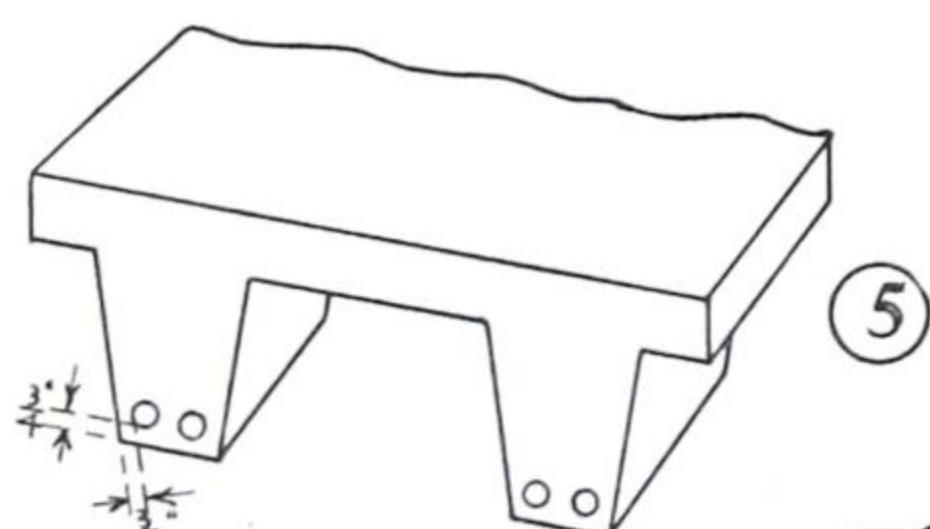
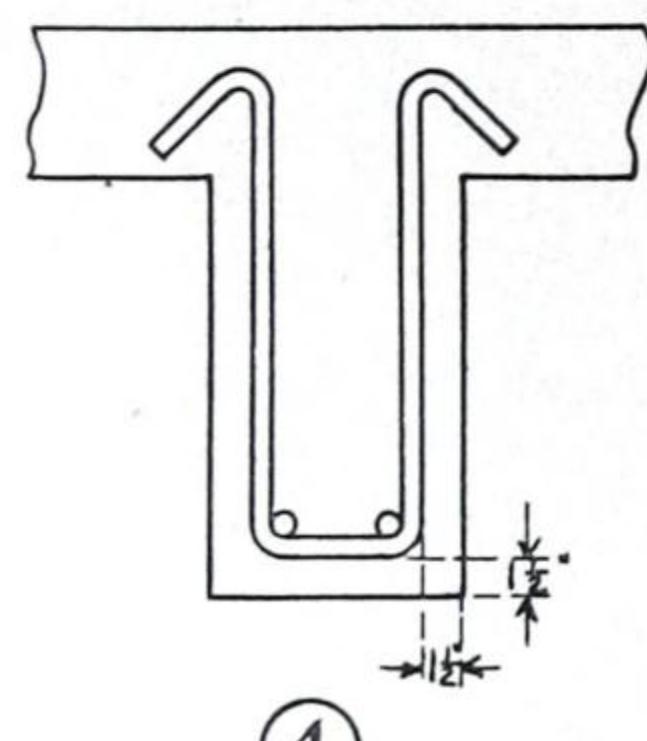
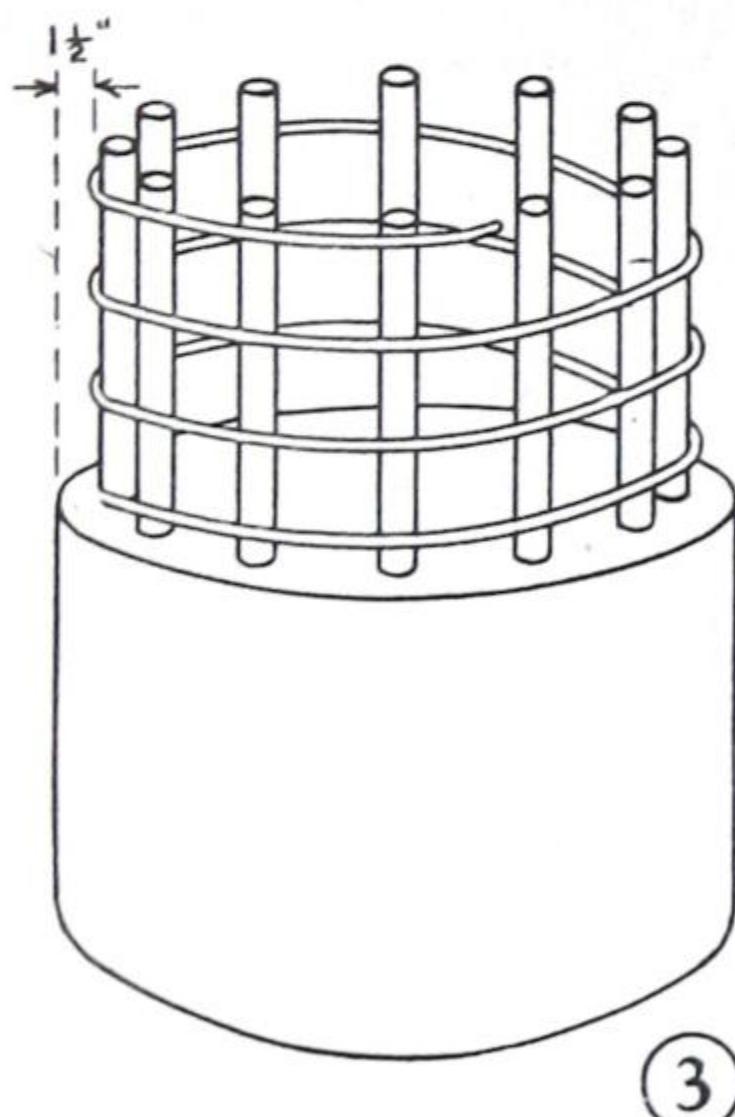
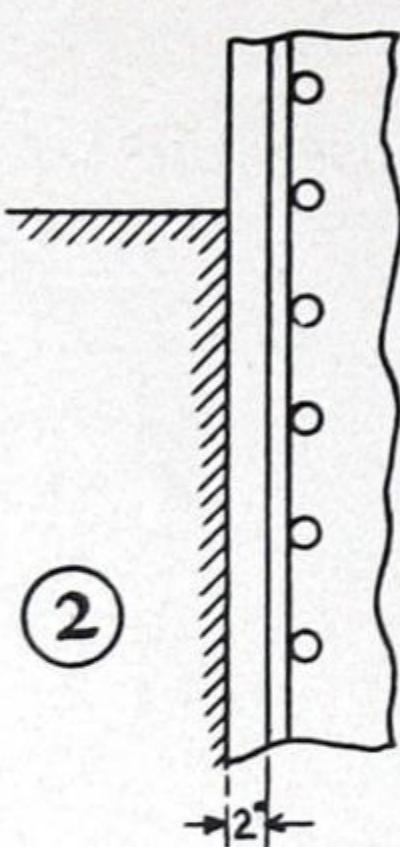
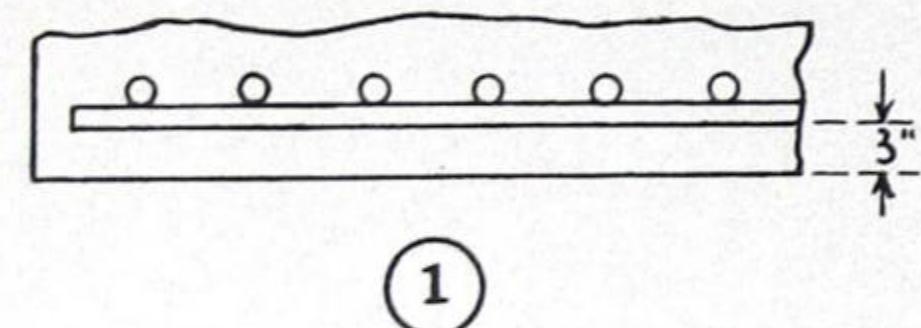
(d) **Bars shall be continuous**—No splices of reinforcing bars shall be made without the approval of the architect or engineer, except where shown on the plans. For column bars the length of lap shall be as specified in III-7-(b). Temperature bars in slabs, walls or footings under walls shall be lapped as specified in III-14. Other deformed bars in tension shall be lapped a distance sufficient to transfer the stress between bars by bond. In all splices the bars shall be spaced at the minimum distance specified in paragraph (c).

(e) **Special Anchorage**—When required special anchorage shall consist of the following:

(a) Bottom reinforcement in beams, joists or slabs is to extend at least ten (10) bar diameters into the support and terminated in a hook as defined in III-6-(a).

(b) Top reinforcement in continuous construction is to extend into adjacent span to a point one-fourth ($\frac{1}{4}$) of the center-to-center span length beyond the center of support, plus six (6) bar diameters and terminated in a hook as defined in III-6-(a). At non-continuous ends truss bars are to extend to within three inches (3") of the outer faces of members into which they frame and terminated in a hook as defined in III-6-(a).

CONCRETE PROTECTION



⑧

(f) *Bars shall be Properly Embedded*—All reinforcing steel shall have a protection of concrete not less than the following:

1. Three inches (3") on bottoms of footings.

2. Two inches (2") where concrete is exposed to action of weather or ground.

3. One and one-half inches (1 1/2") over all reinforcement in columns.

4. One and one-half inches (1 1/2") on the bottom and sides of beams or girders.

5. Three-fourths inch (3/4") on bottoms and sides of joists and bottoms of all floor slabs.

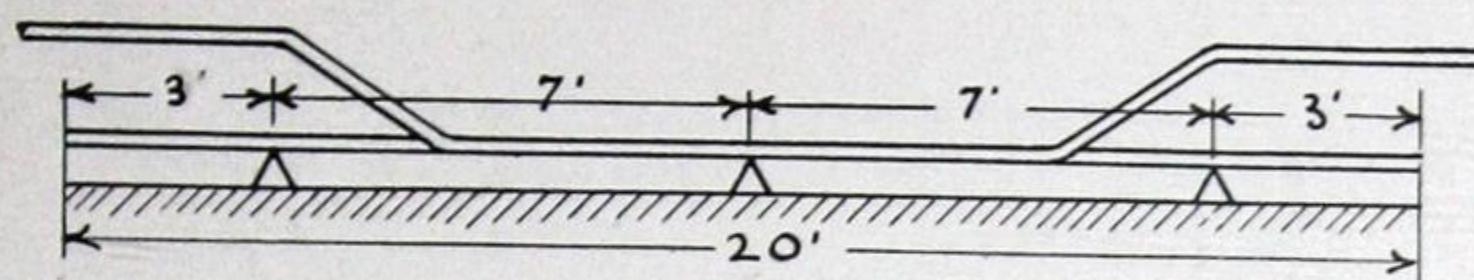
6. Three-fourths inch (3/4") for all slabs not exposed directly to ground or weather.

7. Three-fourths inch (3/4") from the faces of all walls not exposed directly to ground or weather.

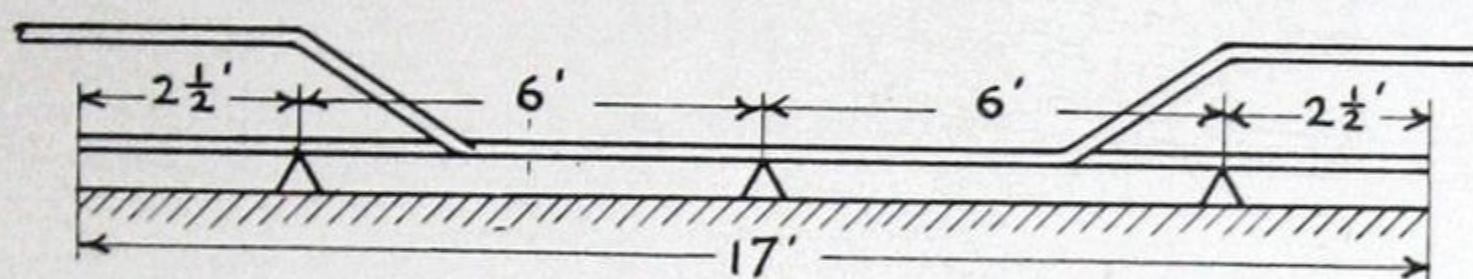
8. One (1) diameter over all bars at the upper face of any member.

SLABS

Concrete Joist Construction

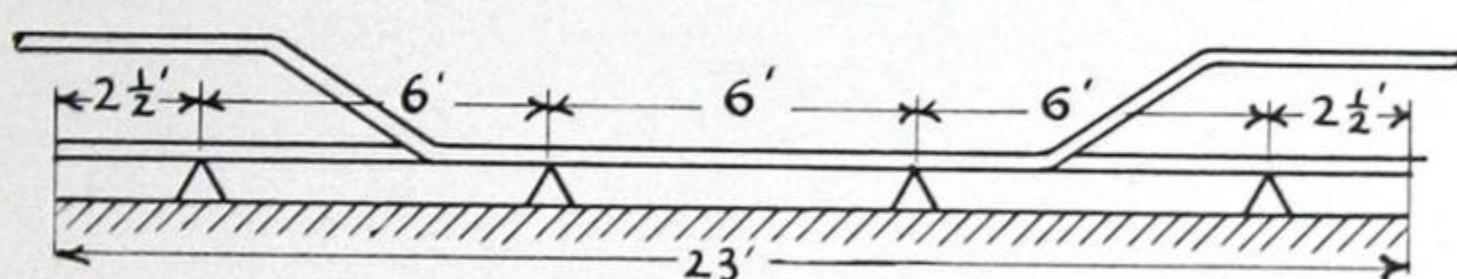
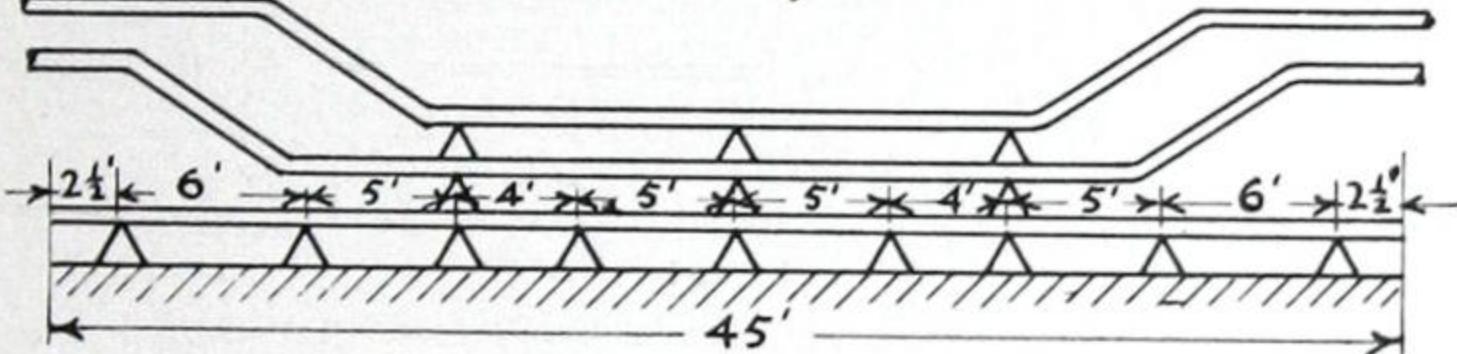


One Way Slabs



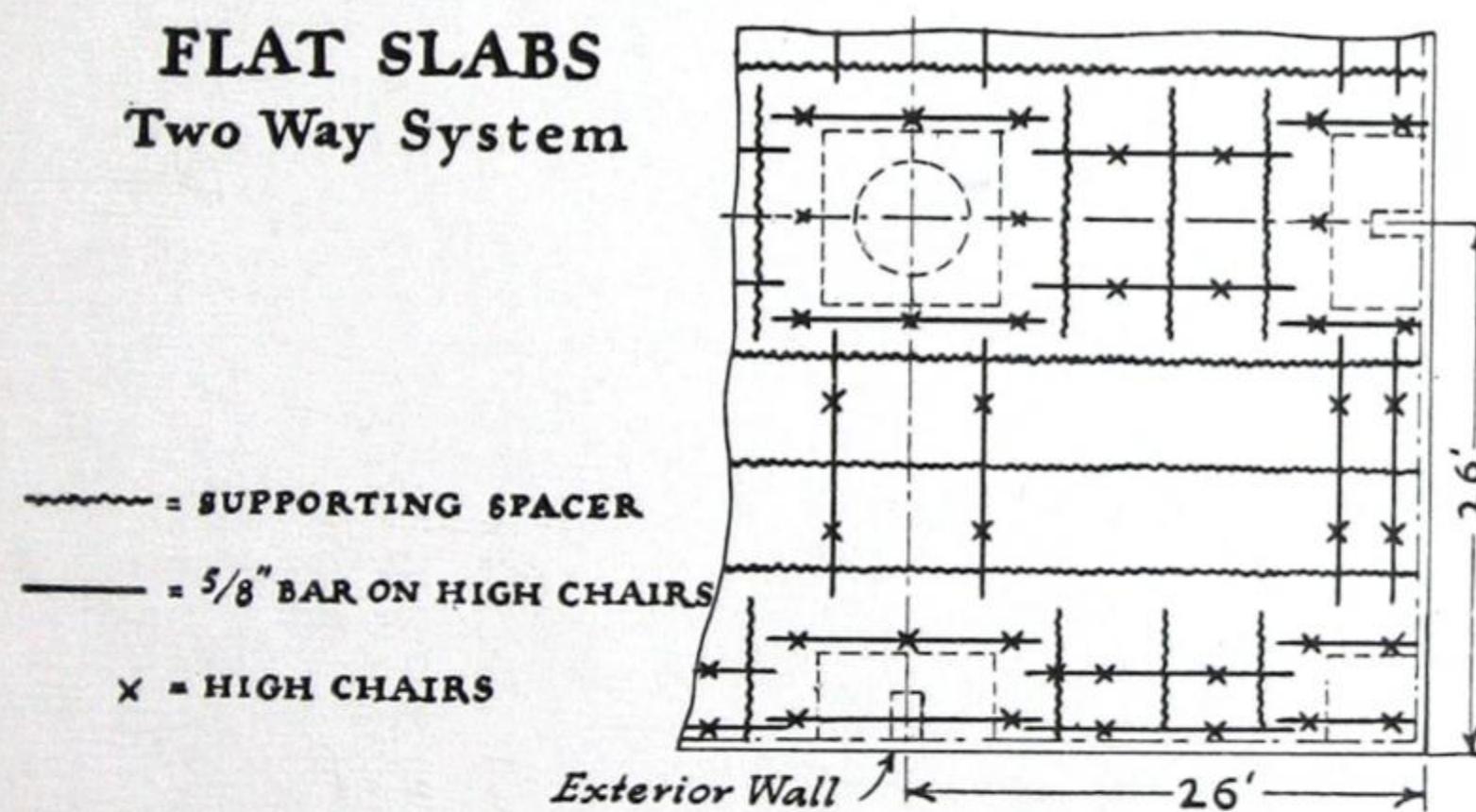
BEAMS (ORDINARY)

Single Layer

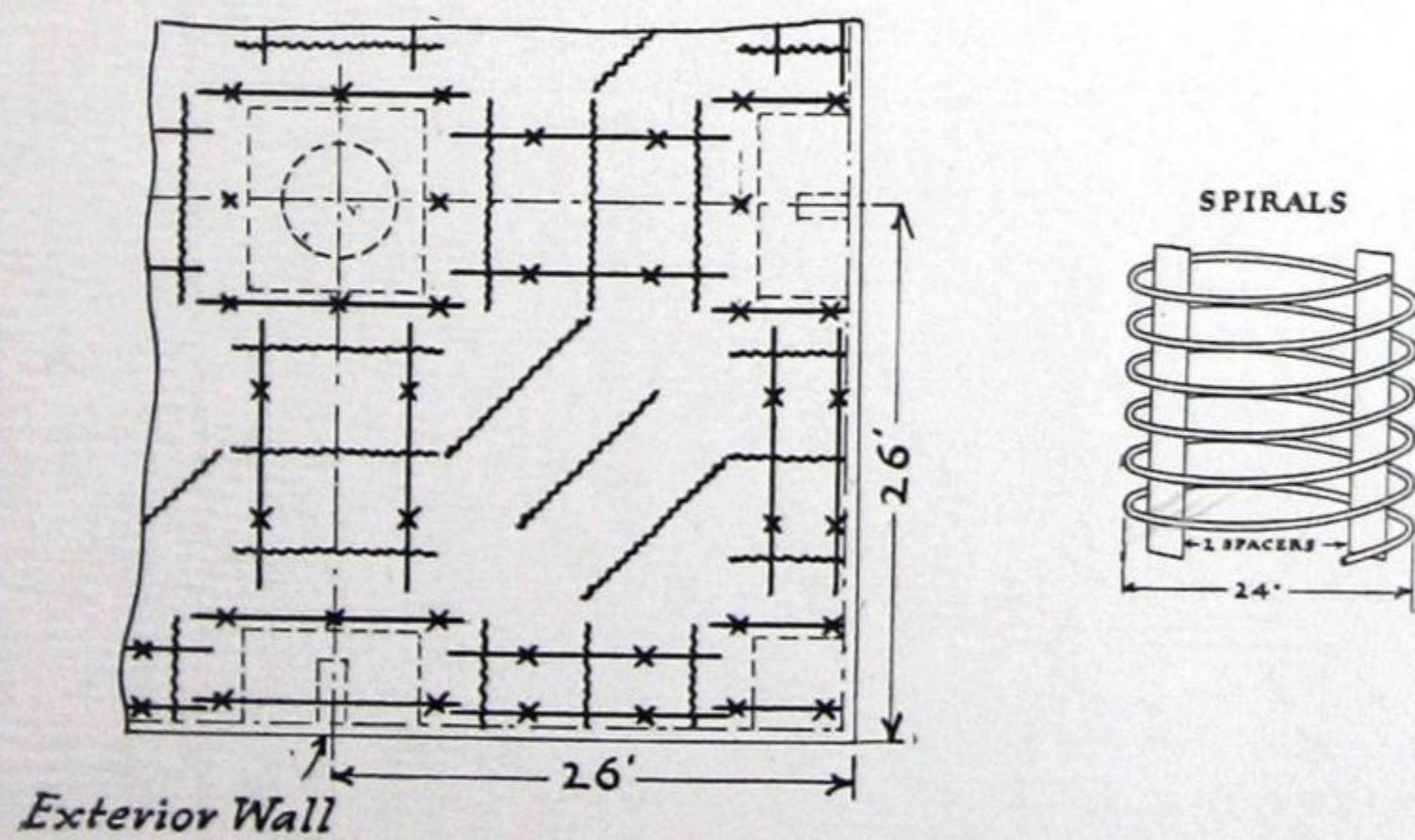

 BEAMS (HEAVY)
Three Layer


FLAT SLABS

Two Way System



Four Way System



(g) **Bars shall be Accurately Located and Firmly Held** —All reinforcing steel shall be accurately located in the forms and firmly held in place before and during the pouring of concrete, by means of metallic supports, spacer bars, wires or other devices adequate to insure against displacement during the course of construction, and to keep the steel at the proper distance from the forms.

1. Bar supports and spacers are to be sufficient in number, and sufficiently heavy to properly carry the steel they support. The number shall be such as to give support not less than the following:

SLABS

Concrete Joist Construction		Solid Slabs with Principal Reinforcing in One or Two Directions	
Clear Spans	Joist Chairs per Joist	Clear Spans	Supporting Spacers per Panel (One Direction Only)
Over 0 ft. to 10 ft.	2	Over 0 ft. to 7 ft.	2 lines
Over 10 ft. to 20 ft.	3	Over 7 ft. to 17 ft.	3 lines
Over 20 ft. to 30 ft.	4	Over 17 ft. to 27 ft.	4 lines

To support ends of bent bars in joists—use a $\frac{3}{8}$ " round bar at each side and parallel to the supporting beam or wall, such $\frac{3}{8}$ " round bar to be held above the permanent or removable form.

BEAMS

Ordinary Beams (Bars One (1) Inch Square and Smaller)

Clear Spans	Number of Beam Chairs					
	Single Layer of Bars	Two Layers		Three Layers		
		Lower	Top	Lower	Middle	Top
Over 0 ft. to 14 ft.	2	2	2	2	2	2
Over 14 ft. to 23 ft.	4	3	2	3	2	2
Over 23 ft.		See table below				

Beams or Slabs with Large Number of $1\frac{1}{8}$ or $1\frac{1}{4}$ Inch Bars

Clear Spans	Number of Beam Chairs					
	Single Layer of Bars	Two Layers		Three Layers		
		Lower	Top	Lower	Middle	Top
Over 0 ft. to 15 ft.	2	3	2	3	2	2
Over 15 ft. to 30 ft.	4	5	2	6	2	2
Over 30 ft. to 45 ft.	6	7	3	9	3	3
Over 45 ft. to 60 ft.	8	9	3	11	3	3
Spacing of Beam Chairs in spans other than above. All Spans.....	8'0"	7'0"	14'0"	5'0"	10'0"	10'0"

FLAT SLABS—Two and Four Way Flat Slabs

Spans (center to center of columns)	Supporting Spacers		High Chairs (to support $\frac{3}{8}$ inch bar under ends of bent bars)		
	Column Strip or Direct Band	Middle Strip or Diagonal Band	Bottom Layer	Support for Column Head Reinforcement	Support for Negative Reinforcement Middle Strip
Over 0 ft. to 18 ft.....	3	2			
Over 18 ft. to 26 ft.....	3	3			
Over 26 ft. to 36 ft.....	4	4			
Around Interior Columns.....				8	
Around Exterior Columns.....				5	
Around Corner Columns.....				4	
In Interior Panels.....					8
In Exterior Panels.....					10
In Corner Panels.....					12

In roof slabs use one (1) more supporting spacer under column strips, direct bands, and bottom layers of middle strips or diagonal bands and one more $\frac{3}{8}$ inch chair bar at column heads, than the number shown in the table above.

SPIRALS—Columns with Spiral Hooping

Core Diameter (Outside to Outside)	Number of Spacers
Over 0 in. to 24 in.	2
Over 24 inches	3

MEMBERS

November 1, 1937

CONCRETE REINFORCING STEEL INSTITUTE

Alamo Iron Works	San Antonio, Texas	Boise, Idaho
Albany Steel & Iron Supply Co., Inc.	Albany, New York	Columbus, Ohio
American Builders Supply Company	Louisville, Ky.	Pittsburgh, Pa.
American System of Reinforcing	Libertyville, Ill.	Chicago, Illinois
Austin Brothers	Dallas, Texas	Cleveland, Ohio
Baker & Company, Hugh J.	Indianapolis, Ind.	Knoxville, Tenn.
Barton-Warner Company	Sioux City, Iowa	Madison, Wisconsin
Beals, McCarthy & Rogers, Inc.	Buffalo, N. Y.	Pittsburgh, Pa.
Bethlehem Steel Company, Inc.	Bethlehem, Pa.	Pittsburgh, Pa.
Booker & Company, Inc.	Tampa, Florida	Pittsburgh, Pa.
Brandt Iron Works	San Antonio, Texas	St. Joseph, Mo.
Bristol Steel & Iron Works, Inc.	Bristol, Va.	Baltimore, Maryland
Buffalo Steel Company	Tonawanda, N. Y.	Danville, Illinois
Builders' Material Co., The	Cedar Rapids, Iowa	Dallas, Texas
Butts, Inc., L. P.	Oneonta, N. Y.	Baltimore, Maryland
Capital Steel Company	Little Rock, Ark.	Ironton, Ohio
Capitol Steel Corporation	Lansing, Mich.	Minneapolis-Moline Power Implem't Co.
Capitol Steel & Iron Company	Oklahoma City, Okla.	Salt Lake City, Utah
Carnegie-Illinois Steel Corporation	Pittsburgh, Pa.	St. Louis, Mo.
Carroll-McCreary Company, Inc.	Brooklyn, N. Y.	Moline, Illinois
Castle & Co., A. M.	Chicago, Ill.	Columbus, Ohio
Ceco Steel Products Corporation (Formerly Concrete Engineering Co.)	Omaha, Neb.	Boston, Mass.
Central Supply Company	Little Rock, Ark.	Dallas, Texas
Central Texas Iron Works	Waco, Texas	National Concrete Metal Forms Corp.
Colorado Builders' Supply Co., The	Denver, Colorado	Chattanooga, Tenn.
Commercial Iron Works	Houston, Texas	North Texas Iron & Steel Company
Concrete Steel Company	New York City, N. Y.	Fort Worth, Texas
Concrete Steel Fireproofing Company	Detroit, Michigan	Northern Lumber & Paint Co.
Connors Steel Company	Birmingham, Ala.	Superior, Wisconsin
Consolidated Iron-Steel Mfg. Company	Cleveland, Ohio	Nu-Form Engineering Corporation
Consolidated Supply Company	Clarksburg, W. Va.	Bronx, New York
Cook & Brown Lime Co., The	Oshkosh, Wisconsin	Orange, Texas
Cowin & Company, Inc.	Minneapolis, Minn.	Panhandle Steel Products Company
Dambach, Inc., W. N.	Pittsburgh, Pa.	Cleveland, Ohio
Darbyshire-Harvie Iron & Machine Co.	El Paso, Texas	Patterson Steel Company
Dave Steel Company	Asheville, N. C.	Peden Iron & Steel Company
Dayton Builders Supply Co., The	Dayton, Ohio	Pensacola Tool & Supply Corp.
Dean Steel Company, Olney J.	Chicago, Ill.	Piedmont Iron Works, Inc.
Decatur Iron & Steel Company	Decatur, Ala.	Pipkorn Company, W. H.
Dietrich Brothers	Baltimore, Md.	Polenske Bros., Schellack & Co.
Dildine Bridge & Iron Co., The	Hannibal, Mo.	Pollak Steel Company, The
Donley Bros. Co., The	Cleveland, Ohio	Riesner & Son Company, B. A.
Duluth Builders Supply Company	Duluth, Minn.	Rosslyn Steel & Cement Company
Easterby & Mumaw	Charlotte, N. C.	Ryerson & Son, Inc., Joseph T.
Erie Concrete & Steel Supply Co.	Erie, Pa.	Salem Steel Company, Inc.
Everett Building Products Company	Houston, Texas	San Jose Steel Company, Inc.
Fargo Foundry Company	Fargo, N. D.	Schilling Company, I. E.
Farquhar Machinery Company	Jacksonville, Fla.	Sheffield Steel Corporation
Fireproof Products Co., Inc.	New York City, N. Y.	Shipe, Paul E.
Flint Structural Steel Company	Flint, Michigan	Southern Engineering Company
Fort Worth Structural Steel Company	Fort Worth, Texas	Southern States Steel Corporation
Franklin Steel Works	Franklin, Pa.	Standard Salt and Cement Company
Gabriel Steel Company	Detroit, Michigan	Steel Products Company
Genesee Bridge Company	Rochester, N. Y.	Steelform Contracting Company
Goldsmith Metal Lath Co., The	Cincinnati, Ohio	Structural Steel & Fdry. Company
Grand Rapids Steel & Supply Co.	Grand Rapids, Mich.	Superior Concrete Accessories, Inc.
Gunn, Carle & Company	San Francisco, Calif.	Taylor-Davis, Inc.
Hartwell Iron Works	Houston, Texas	Taylor Steel & Wire Company
Hassenstein Steel Company	Sioux Falls, S. D.	Tennessee Coal, Iron & R. R. Co.
Hauck & Company, W. C.	San Francisco, Calif.	Tips Engine Works
Hausman Steel Co., Inc., The	Toledo, Ohio	Truscon Steel Company
Herrick Iron Works	Oakland, California	Union Steel Products Company
Heughes & Company, Inc., F. L.	Rochester, N. Y.	Universal Form Clamp Company
Hoefler & Stoecklein Co., The	Dayton, Ohio	Vance Iron & Steel Company
Hopmann Cornice Company	St. Louis, Missouri	Vermont Structural Steel Corp.
Hustad Company, The	Minneapolis, Minn.	Virginia Steel Company, Inc.
Idaho Hardware & Plumbing Co., Ltd.	Boise, Idaho	Voggenthaler Company, E. J.
Igoe Brothers	Newark, New Jersey	Vredenburgh Lumber Company, Peter
Inland Steel Company	Chicago, Ill.	Western Iron and Foundry Company
		West Virginia Rail Company
		Wetenhall Company, W. S.
		Wilson-Weesner-Wilkinson Company
		Wichita, Kansas
		Huntington, W. Va.
		San Francisco, Calif.
		Knoxville, Tenn.

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CCA

THE CODE OF STANDARD PRACTICE
IN GENERAL SPECIFICATIONS FOR REINFORCING
MATERIALS

In addition to your specifications covering grade of steel, type of bar and other requirements pertaining to reinforcing materials, be sure to include the following paragraph:

**The Code of Standard Practice and Specifications
for Placing Reinforcement of latest adoption by the
Concrete Reinforcing Steel Institute shall govern the
use and application of all reinforcing bars in this
structure and all practices relating thereto shall con-
form to the provisions of said Code and Specifications
except as otherwise specified.**